Deepwater Horizon Waste Management Quality Assurance Project Plan

Unified Command

6019122

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1.0 DESCRIPTION

This Waste Management Quality Assurance Project Plan (QAPP) is designed to guide sampling and characterization activities of waste for disposal purposes. These waste are encountered as part of activities associated with the BP Deep Water Horizon response. This document summarizes the methods that shall be used for the sampling and analysis of liquid and solid waste samples.

The sampling approach that will be applied to the waste sampling consists of, but not limited to:

- Oil-impacted material that may include debris, soil, sand, pebbles, vegetation; solid weathered oil (e.g., tar balls); PPE; disposal equipment; sorbents; etc. Material shall be drained of recoverable oil, as practicable (oil shall be collected for potential re-processing or other use).

- Non-oily solids that may include municipal waste material that has been recovered from support operations of the cleanup activities, including trash and garbage.

- Water, oil and emulsion collected during skimming operations, by vacuum truck from decontamination facilities, management of storm water at land-based decontamination sites, etc. This category also includes excess decontamination water that accumulates during the closed loop decontamination process.

Sampling methods, locations, quality assurance (QA) procedures, and the analytical approach and methods that shall be used are discussed in this document.

The QAPP has been developed to ensure data quality by detailing specific methods and procedures. The goal of the QAPP is to achieve complete and accurate environmental data sets. To compliment this QAPP, standard operating procedures (SOPs) for the collection of representative waste samples is provided as Attachment 1 and Attachment 2.

The QAPP portion of this document was designed to be consistent with US Environmental Protection Agency (US EPA) *Guidance for Quality Assurance Project Plans* (US EPA, 2002a) as well as US EPA Document No. RCRA-09-89-0018 (US EPA, 1991a). This document has been developed as a companion to the Unified Command Deepwater Horizon Quality Assurance Project Plan for the BP MC252 Incident (BP-MC252-QAPP, June 14, 2010).

1.1 Introduction

This QAPP portion of this document has been prepared to ensure that the quality of work performed during the sampling and characterization of liquid and solid wastes shall meet the project objectives as presented herein.

1.2 Project Description and Objectives

Under the BP Deep Water Horizon response activities, a variety of materials will be encountered that will require management by recycling or disposal. These materials must be evaluated to determine if they are exempt E & P wastes (see Appendix A), recoverable oil/water mixtures or solid wastes destined for disposal. Analyses of non-exempt E&P solid wastes will be used to properly classify the wastes as hazardous or non-hazardous. The sampling that will be performed, may include, but is not limited to:

- Oil-impacted material such as debris, soil, sand, vegetation; solid weathered oil (e.g., tar balls); PPE; disposal equipment; sorbents; etc. Material shall be drained of recoverable oil, as practicable (oil shall be collected for potential re-processing or other use).

- Non-oily solids that may include municipal waste material which has been recovered from support operations related to the cleanup activities, including trash and garbage.

- Water, oil and emulsion collected during skimming operations, by vacuum truck from decontamination facilities, management of storm water at land-based decontamination sites, etc. This category also includes excess decontamination water that accumulates during the closed loop decontamination process.

The Field Consultant shall determine the exact number and location of samples to be collected and shall execute the sampling in accordance with their specific Analytical Request Form (ARF) planning tool as described in Attachment 3. Samples may be collected from any number of staging areas by the Field Consultant. Samples shall be thoroughly mixed before transfer to an appropriate sample container. Sample analysis shall be performed by BP-contracted laboratories. Each of those BP-contracted laboratories also possesses accreditation through the National Environmental Laboratory Accreditation Conference (NELAC).

Wastes generated by spill cleanup activities must be managed in accordance with the “Second Amended Declaration of Emergency and Administrative Order” issued by the State of Louisiana May 17, 2010, and the Louisiana solid and hazardous waste regulations. US EPA has authorized Louisiana to operate the Federal hazardous waste program in the State. In order to comply with these requirements a waste determination for spill related materials is required.

State and Federal regulations and guidance provide a process for determining if a material is a solid waste and subject to hazardous waste regulations. This process will be applied to characterize spill related materials for appropriate waste classification and subsequent management as follows:

- Oil/water mixtures – Not a solid waste when recovered. Wastes generated from oil recovery will be managed as E&P wastes or be evaluated for RCRA characteristics as appropriate

- Oil/water mixtures – Managed as E&P wastes if disposed

- Used boom and oily solids are classified as solid wastes or exempt E&P as specified in Appendix B of the May 17th Declaration of Emergency from Louisiana

- Wastes generated by spill related activities (aerosol cans, batteries, etc) are typically solid wastes and must be characterized

Except for laboratory wastes, no listed wastes are expected from cleanup activities. Therefore, non-exempt E&P solid wastes will be evaluated for RCRA characteristics of hazardous waste. Based on generator knowledge wastes from spill cleanup activities will be characterized under this QAPP are as follows:

- Toxicity Characteristic Leaching Procedure/TCLP Volatile Organics by SW846 Method 1311/8260C.
- Toxicity Characteristic Leaching Procedure/TCLP Semivolatile Organics by SW846 Method 1311/8270D.
- Toxicity Characteristic Leaching Procedure/TCLP Metals by SW846 Method 6010C/7470A.
- Ignitability by SW846 Chapter 7 (liquid wastes only).
- Paint Filter Test by SW846 Method 9095B (solid wastes only)

Previous sampling of spill cleanup materials has shown the materials do not exhibit hazardous waste characteristics. Based on this knowledge, BP will sample and analyze selected waste streams weekly to verify the consistency of the waste materials. Staging locations for sampling will be selected based on availability of waste for sampling.

Sampling tasks shall be performed in accordance with the requirements set forth in this QAPP and the sampling solid waste and liquid sampling SOPs (Attachments 1 and 2, respectively). If the US EPA or other governing body collects characteristics and analyses for liquid or solid waste samples, the Field Consultant shall perform split sampling and mirror the characteristics and analyses selected by the US EPA or other governing body.

To achieve the project data quality objectives (DQOs) as presented in Section 3, QA measures shall be implemented to ensure that the data meet known and appropriate data quality criteria such as accuracy, precision, representativeness, comparability, sensitivity, bias, and completeness. The sampling data shall be quality-controlled through the collection of field QC samples. Implementation of QA/QC measures shall allow project personnel to assess data quality relative to the established DQOs.

Data will be managed in accordance with the Unified Command Deepwater Horizon Data Management Plan for the BP MC252 Incident (BP-MC252-DMP, June 14, 2010).

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

This section describes the organizational structure, lines of authority, and responsibilities of key project individuals. Project activities shall be performed within the framework of the organization and functions presented in this section. The sample collection events shall be project specific, a general project organization chart is provided as Figure 2-1. Emphasis is placed on the organization and entities responsible for implementation and administration of this QAPP.

The organizational structure is designed to provide clear lines of responsibility and authority. This control structure encompasses the following activities:

- Identifying lines of communication and coordination.
- Monitoring project schedules and performance.
- Managing key technical resources.
- Providing periodic progress reports.
- Coordinating support functions such as laboratory analysis and data management.
- Rectifying deficiencies.

Contractor and laboratory personnel providing services in support of this work shall perform work in strict compliance with the appropriate contract specifications and this QAPP for the activity. In addition to project QA, contractor corporate-level QA personnel shall review and audit project procedures, document compliance, identify deficiencies, and recommend corrective action, if required.

QA personnel shall have sufficient authority, organizational freedom, and ability to perform the following tasks:

- Identify QA problems.
- Initiate, recommend, or provide solutions to QA problems through designated channels.
- Ensure that project activities, including processing of information, delivery of deliverables, and installation or use of equipment, are reviewed in accordance with QA objectives.
- Ensure that deficiencies/non-conformances are corrected.
- Ensure that further processing, delivery, or use of data is controlled until the proper disposition of a nonconformance, deficiency, or unsatisfactory condition.

2.1 BP – Project Manager

The BP Project Manager is responsible for defining project objectives and establishing project policy and procedures to address the specific needs of the waste sampling and analysis. In addition, the BP Project Manager shall review and analyze overall task performance with respect to planned requirements and authorization and represent BP at meetings.

2.2 Field Consultant Responsibilities

Under the direction of the BP Project Manager, the field consultants shall be responsible for sample collection. The firms utilized for sample collection shall be determined at the initiation of the waste sample collection project. The field consultant is primarily responsible for the preparing and implementing the attached SOPs; sample collection and the QA procedures and QC measures in accordance with this QAPP.

2.2.1 Field Consultant Project Manager

The Field Consultant Project Manager shall assist the BP Project Manager with the overall project, including scope, schedule, and submittals as necessary. Other responsibilities include promoting continuity, reporting to the BP Project Manager, and providing support and guidance for all activities for the project. The Field Consultant Project Manager shall have oversight responsibility for field activities.

2.2.2 Field Team Leader

The Field Team Leader shall be the primary contact in the field and shall be responsible for all field activities, as listed below.

- Completion of the Analytical Request Form (ARF)
- Coordination and management of all field personnel and subcontractors.
- Oversight of ordering and delivery of supplies.
- Ensuring field procedures are followed to achieve the DQOs.
- Review of hardcopy or electronic notebooks with respect to completeness, consistency, and accuracy.
- Daily reporting to the Field Consultant Project Manager.
- Report generation.

2.2.3 Field Teams

The Field Teams are responsible for the performance of field activities as required by this QAPP and the attached SOPs. Field Teams shall document compliance with project documents through recording activities/observations in the field in a hardcopy or electronic field logbook. In addition, field teams shall be responsible for collection of samples, submission of samples to the laboratory, and completion of the Chain-of-Custody Records.

2.3 Quality Assurance Oversight Manager

The Quality Assurance Oversight Manager (QAOM) shall oversee all quality assurance aspects of the project relative to conformance with this QAPP, the attached SOPs, and applicable US EPA requirements. Specific tasks are listed below.

- Review and approval of project planning documents (*i.e.*, ARFs).

- Oversight of laboratory and field audits.
- Oversight of performance evaluation studies.
- Oversight of analytical data validation.
- Support the analytical laboratories with sample preparation and analysis issues.
- Support the Field Teams with sample collection and data issues.
- Resolve compliance issues originating from the field, laboratory, or data validation.

2.3.1 Data Validation Task Manager

The Data Validation Task Manager shall be responsible for the validation of the laboratory-produced data. The Data Validation Task Manager is responsible for notifying the QAOM of issues relating to the quality or validity of the data and reporting with respect to project objectives and requirements.

2.3.2 Data Validator

The Data Validator is responsible for performing review and validation of all project data generated by the laboratories in accordance with this QAPP production of the data validation reports, and notification of issues to the Data Validation Task Manager.

2.3.3 Field Auditor

The Field Auditor shall be responsible for performing an audit of the field team during the collection of samples for this project. The Field Auditor shall assess the procedures and performance of the field team relative to the requirements detailed in this QAPP and the attached SOPs. The Field Auditor shall generate a report of findings to be distributed to the QAOM, Field Consultant Project Manager, and BP Project Manager. The Field Auditor may participate in follow-up with corrective actions.

2.3.4 Laboratory Auditor

The Laboratory Auditor is responsible for auditing the BP-contracted laboratories and for notifying the QAOM and BP Project Manager of issues relating to quality or validity of the laboratory procedures. On-site laboratory audits shall be performed at the discretion of the BP Project Manager. For each facility, the Laboratory Auditor shall generate a report that details the findings of the audit. The completed audit report shall be submitted to the BP Project Manager, the QAOM, and the Laboratory QA Officer.

2.4 Laboratory Organization and Responsibilities

For the characterization of samples, the designated laboratory shall support the effort described in this QAPP. Processes shall be arranged with the designated laboratory to facilitate information exchange among BP, the field consultants, the laboratory and QA personnel. This exchange includes planning, technical requirements, schedules, and QA/QC measures.

The functional roles for the laboratory are described in this subsection. Project information exchange specifically includes sample identification; preservation procedures; sample container requirements; sample collection procedures; decontamination protocols; and sample labeling, packing, holding times, and shipping.

2.4.1 Laboratory Project Manager

The Laboratory Project Manager shall be the primary contact for the Project Team. The Laboratory Project Manager shall schedule project analytical requirements, monitor analytical status/deadlines, approve laboratory reports, coordinate data revisions/corrections and submittal of packages, and communicate sample preparation and analyses issues to the QAOM and Field Consultant Project Manager on a real-time basis. The Laboratory Project Manager shall provide direction/support for administrative and technical project staff, interface with laboratory project staff on technical issues, and QA oversight of analytical data. The Laboratory Project Manager shall contact QAOM if at any point there is a need to deviate from the QAPP or other sited published materials.

2.4.2 Laboratory QA Coordinator

The Laboratory QA Coordinator shall ensure conformance with authorized policies, procedures, and sound laboratory practices as necessary. The Laboratory QA Coordinator shall inform the Laboratory Project Manager of any non-conformances, introduce control samples into the sample train, and establish testing lots. In addition, the Laboratory QA Coordinator shall approve laboratory data before reporting or transmittal to permanent storage and shall be responsible for retention of supporting information such as control charts and other performance indicators to demonstrate that the systems that produced the data were in control. The Laboratory QA Coordinator shall also review results of internal QA audits and recommend corrective actions and schedules for their implementation.

The responsibilities of the Laboratory QA Coordinator shall include, but not be limited to, the following:

- Administering the laboratory QA/QC program.
- Implementing QC procedures for each test parameter.
- Reviewing analytical results, including raw data, calculations, and laboratory log books.
- Monitoring proper documentation and maintenance of the records.
- Identifying and implementing training requirements for the laboratory analytical personnel.
- Overseeing QA/QC implementation at the laboratory on a daily basis.
- Identifying QA/QC problems and recommending appropriate corrective action.
- Preparing status reports (progress, problems, and recommended solutions).
- Preparing reports documenting completion of corrective actions.

2.4.3 Laboratory Sample Custodian

The Laboratory Sample Custodian (LSC) shall receive samples from the field, sign and date Chain-of-Custody forms, record the date and time of receipt, and record the condition of shipping containers and sample containers.

The LSC shall verify and record agreement or non-agreement of information on sample documents. If there is non-agreement, the Sample Custodian shall record the problems/inconsistencies for the case file and shall inform the Laboratory Project Manager.

The LSC shall also label samples with laboratory sample numbers, place samples and spent samples into appropriate storage and/or secure areas, and monitor storage conditions.

3.0 QUALITY ASSURANCE AND QUALITY CONTROL OBJECTIVES

This section describes the data quality objectives and associated data quality indicators used for the project. QA/QC procedures are designed to ensure high quality for all environmental data collected on behalf of BP.

3.1 Data Quality Objectives

Data Quality Objectives (DQO) define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose, and specify the performance requirements for the quality of information to be obtained from the data. The DQO process is a seven-step iterative planning approach used to prepare plans for environmental data collection activities. DQO formulation for waste sampling and analysis are as follows:

In general, DQOs provide a qualitative and quantitative framework around which data collection programs can be designed. The qualitative aspect of DQOs seeks to encourage proper planning through the effective QA processes established by the Quality Assurance Oversight, including but not limited to the use of the Analytical Request Form (ARF) process. The ARF is a planning tool designed to ensure proper planning and schedule between the field sampling and project laboratory personnel. The quantitative aspect of DQOs involves designing an efficient field investigation that controls the possibility of making an incorrect decision.

Step 1: State the Problem

During various activities associated with response activities, liquid and solid materials shall be encountered that need to be properly disposed. These liquid and solid materials must be characterized for proper disposal.

Step 2: Identify the Decision

Are the various liquid and solid materials that are collected hazardous or non-hazardous for disposal purposes?

Step 3: Identify Inputs to the Decision

The manner in which samples are collect must be representative of the conditions observed in the environment. QC samples need to be collected to provide information on accuracy and precision. A NELAC accredited BP-contracted laboratory must be used for the characterization.

Step 4: Define the Project Boundaries

The project boundaries extend to wherever materials have come into contact or potentially have come into contact shall oil from the MC252 incident.

Step 5: Develop a Decision Rule

If solid materials are characterized as hazardous, shipment and disposal methods must be in accordance with the applicable regulatory requirements. If materials are characterized as non-hazardous, proper disposal can be performed with fewer restrictions.

Step 6: Specify Limits on the Decision

The US EPA hazardous characteristics rule defines the TCLP and hazardous characteristics as published in the US EPA SW-846. These applicable characteristics include the hazardous criteria listed for TCLP volatiles, TCLP semivolatiles, TCLP metals and ignitability. If laboratory results are above the hazardous criteria for any single analyte, the sample shall be designated hazardous for disposal purposes. If laboratory results are below the hazardous criteria for all analytes and characteristics, the sample shall be designated as non-hazardous for disposal purposes. Solid wastes will also be evaluated for Paint filter testing.

Step 7: Optimize Sampling Design

Based on the results of QC samples that are collected (blanks, duplicates and matrix spikes), if results are outside the accuracy and precision DQOs, the sampling design shall be evaluated for further optimizing.

Table 3-1 presents the analytical methods, regulatory limits, the laboratory reporting limits (reporting limits), and accuracy and precision data quality indicators (DQIs) for waste samples (*e.g.*, leachate samples). These limits and goals, as well as the data quality indicators described below, serve to limit decision errors. The actual laboratory reporting limits shall vary depending upon the sample matrix and the sample dilution factors. Corrective actions associated with the accuracy and precision goals are presented in Section 11.0. The Code of Federal Regulations (CFR) Title 40 Parts 261.21, 261.22, and 261.24 specify the regulatory limits which are provided on Table 3-1 to be used for evaluation of analytical data generated under this QAPP.

3.2 Data Quality Indicators

Data quality shall be assessed using the DQIs described below and obtained from US EPA *Guidance for Quality Assurance Project* (US EPA, 2002a).

3.2.1 Data Precision

Precision is the degree of agreement between repeated, independent measurements. Field measurement precision is determined by replicate sample measurements. The precision of laboratory analyses is determined by replicate sample analyses and/or replicate matrix spike sample analyses. Precision, as relative percent difference (RPD), is calculated by dividing the difference of the replicate analytical results by the mean of the replicate analytical results, as shown below.

$$RPD = \frac{X_a - X_b}{X_a + X_b} \times 200$$

Where X_a is the larger of the replicate analytical results and X_b is the smaller of the replicate analytical results. When both replicates are within a factor of five-times the reporting limit, the calculated precision may not be significant.

3.2.2 Data Bias

Data bias is the systematic distortion of a measurement process that causes errors to skew the data in one direction.

3.2.3 Data Accuracy

Accuracy is the degree to which the sample result agrees with the actual concentration of a parameter. The accuracy of laboratory measurements is determined by analyses of matrix spike samples. Accuracy, as percent recovery, for a matrix spike sample is calculated by subtracting the sample result from the matrix spike sample result and then dividing the outcome by the amount of spike added to the matrix spike sample, as shown below.

$$MSAccuracy = \frac{X_c - X_a}{S} \times 100$$

Where X_a is the sample result, X_c is the matrix spike sample result, and S is the amount of the spike added to the matrix spike sample.

Accuracy, as percent recovery, for a laboratory control sample is calculated by dividing the sample result by the amount of spike added to the laboratory control sample, as shown below.

$$LCSAccuracy = \frac{X_c}{S} \times 100$$

Where X_c is the laboratory control sample result and S is the amount of the spike added to the laboratory control sample.

Accuracy, as percent recovery, for a surrogate is calculated by dividing the sample surrogate result by the amount of surrogate spike added to the sample, as shown below.

$$SurrogateAccuracy = \frac{X_c}{S} \times 100$$

Where X_c is the surrogate compound result in the sample and S is the amount of the surrogate spike added to the sample.

3.2.4 Data Completeness

Completeness is the degree to which the proposed sampling locations yield usable data of the type requested. Proposed sample collection points may fail to produce usable data for many reasons (*e.g.*, field conditions that prevent collection of samples, sample container breakage, elevated storage temperature, exceeded sample holding time, or data loss). Percent completeness is calculated by dividing the number of usable data points by the number of proposed sample collection points, as shown below.

$$Completeness = \frac{U}{P} \times 100$$

Where *U* is the number of usable data points and *P* is the number of proposed sample collection points. In general, the completeness goal for waste characterization is 90%.

3.2.5 Data Representativeness

Data representativeness is "the degree to which a data set can accurately and precisely characterize the environment and the parameter conditions at the point of sample" (American National Standards Institute/American Society for Quality Control [ANSI/ASQC], 1995). Data representativeness is attained through the proper design of the sampling program and should be in a constant state of assessment.

3.2.6 Data Comparability

Data comparability is the confidence with which one data set can be compared to another data set. Data comparability shall be achieved by using standard sampling and analytical techniques and by documenting all QA/QC measures and procedures. QA/QC procedures shall be considered when comparing data sets.

The laboratory shall be responsible for enhancing comparability by using the controls listed below.

3.3 Field and Laboratory Quality Control Samples

The quality of data shall be controlled, monitored, and verified by maintaining field notes, documenting field activities, and collecting and analyzing QC samples concurrently with investigative samples. Field and laboratory QC samples shall be used to assess accuracy and precision to gauge both field and laboratory activities. QC samples shall be collected and analyzed in conjunction with samples designated for laboratory analysis.

Standard analytical QC checks that may be instituted by field and laboratory personnel include, but are not limited to, the following:

- Temperature Blanks.
- Leachate Blanks.
- Field Duplicate Samples.
- Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Samples.
- Method Blanks.
- Laboratory Control Samples (LCSs).
- Laboratory Duplicate (LD) Samples.
- Surrogate Spiking.
- Internal Standard Spiking.

These above-cited QC checks are discussed in the following subsections. Table 3-1 provides a summary of the QC checks associated the projects. Field QC samples shall be submitted to the laboratory using the same information as that submitted for the associated investigative samples. Quality assurance/quality control (QA/QC) samples shall be collected according to the following:

- Temperature blanks shall consist of a container filled with water and clearly labeled as "temperature blank." The temperature blank shall be packaged along with the field samples in the shipping cooler and shall represent the temperature of the incoming cooler upon receipt at the laboratory. Use of these samples within a shipping container enables the laboratory to assess the temperature of the shipment without disturbing any of the field samples.

- Leachate blanks consist of analyte-free leachate fluid (same lot as used to prepare samples) that undergoes the TCLP tumble and subsequent preparation (i.e., extraction), analyzed, and reported in the same manner as the associate investigative samples. A leachate blank shall be generated with each TCLP tumble event of up to 20 investigative samples. For the leachate blank analysis to be considered acceptable, the following conditions must be met: concentration of target analyte in the leachate blank does not exceed the reporting limit of the analyte; the associated sample concentration is ≥ 10× the leachate blank concentrations; or the sample displays a "not-detected" result for the analyte.

- Field duplicate samples shall be collected during sampling activities to assess sample representativeness. The data obtained from these samples shall be used to assist in the quality assurance of the sampling procedures and laboratory analytical data by allowing an evaluation of reproducibility of results. Field duplicate samples shall be collected at the rate of one duplicate sample for every 10 samples collected.

  The DQI for TCLP field duplicate results is as follows: if the sample result for each sample is equal to or greater than five-times the reporting limit, the RPD between sample results should be less than or equal to 20%; if at least one of the sample results is less than five-times the reporting limit, the absolute difference between the results should be less than or equal to the higher of the reporting limits. If a result is reported as "not-detected," the value of the reporting limit shall be utilized to calculate the difference.

- Matrix spike/matrix spike duplicate (MS/MSD) samples are investigative samples to which known amounts of analytes are added to the TCLP leachate after leachate generation but before solvent extraction/acid digestion and analysis. Data obtained from these samples shall be used to assist in the quality assurance of the sampling procedures and laboratory analytical data by allowing an evaluation of reproducibility of results. The laboratory shall prepare and analyze one set of MS/MSD with every batch of samples up to 20 samples. Table 3-1 provides the recovery limits and RPD limits for the MS/MSD compounds and analytes.

- Method blanks consist of analyte-free materials (e.g., reagent water) that are prepared (i.e., digested) and analyzed and reported in the same manner as the associated investigative sample leachates. The method blank shall not undergo TCLP preparation. For the method blank analysis to be considered acceptable, the following conditions must be met: concentration of target analyte in the method blank does not exceed the reporting limit of the analyte; the associated sample concentration is $\geq 10 \times$ the method blank concentration; or samples display "not-detected" results for the analyte.

- Laboratory control samples (LCS) consist of laboratory-certified reagent-grade water fortified (spiked) with the analytes of interest or a certified reference material that is prepared and analyzed. The LCS must be from a source that is different from the source of the initial calibration standards (i.e., second-source). The LCS shall not undergo TCLP preparation. LCS data are used to monitor analytical accuracy and laboratory performance. LCSs shall be prepared and analyzed with each preparation batch of 20 (or less) investigative samples. Table 3-1 provides the recovery limits for the LCS compounds and analytes.

- A laboratory duplicate sample shall be obtained by splitting an investigative sample leachate into two separate aliquots and performing separate preparation and analysis of the aliquots. The laboratory duplicate sample analyses monitor precision of the preparation and analysis. Laboratory duplicates shall be prepared and analyzed for samples that require metals, mercury analyses. A laboratory duplicate sample shall be prepared and analyzed with each preparation batch of 20 (or less) investigative samples.

- Surrogate spiking consists of adding reference compounds to samples before sample preparation for analysis. Surrogate compound recovery can be used to assess method accuracy on a sample-specific basis. Surrogate compounds shall be added to investigative and QA/QC sample analyses as appropriate to the analytical method. Table 3-2 provides the recovery limits for the surrogate compounds.

- Internal standard spiking consists of adding reference compounds to samples immediately prior to analysis. Internal standards will be used to perform quantification of all target analytes analyzed by SW-846 Methods 8260C and 8270D. Internal standard compounds will be added to all investigative and QA/QC samples. SW-846 Methods 8260C and 8270D specify the acceptance criteria for internal standard compounds.

3.4 Schedule

Each sample collection event shall be addressed as a separate project. The project schedule is contingent on each project. It is anticipated schedule of activities is detailed below.

- Waste sample characterization is identified as a requirement.
- The Field Consultant Project Manager or designate shall evaluate the waste to be characterized for disposal..
- The BP Project Manager or designate shall approve initiation of the field work.
- The Field Team shall complete the sample collection.
- Samples shall be delivered to the laboratory.
- The laboratory shall provide a BP Limited Data Package and EDD to BP no later than 5 calendar days after sample receipt.
- The laboratory shall provide BP Full Data Package Deliverable to BP within 28 business days of sample receipt.
- Perform a Stage 2A validation within 1 calendar day of each data package receipt to posting data on bp.com.
- Perform a Stage 4 validation of 20% of the total waste characterization data and generate reports within 28 calendar days of the identification of the data package for Stage 4 validation.

3.5 Special Training/Certification

All Field Team personnel shall have completed a training course of at least 40 hours that meets the requirements specified in 29 CFR Part 1910.120(e) on safety and health at hazardous waste operations and a refresher course of at least 8 hours that meets the requirements of 29 CFR Part 1910.120(e) on safety and health at hazardous waste operations within the last 12 months.

All individuals who plan to participate in field activities shall notify the Field Team Leader of their intent to participate and provide evidence of current health and safety training prior to commencement of sample collection activities. The Field Team Leader shall ensure all participants who arrive on-site have provided evidence of health and safety training.

No other specialized training is anticipated for this project. Field personnel performing sample collection activities shall be properly trained in equipment use and procedures necessary for each task prior to entering the field. The Field Consultant shall employ its internal processes/procedures for establishing that personnel are adequately experienced in the duties they are expected to carry out and are receiving any needed training. Training courses or workshops on specific equipment, techniques, or procedures shall all be documented. It shall be the responsibility of the Field Team Leader to ensure that field personnel understand and comply with the applicable QAPP and the attached SOP requirements for their individual tasks.

Personnel who are responsible for performing laboratory analyses shall be properly trained by the Laboratory Director or her/his designee to conduct the various laboratory analyses described in this QAPP. The laboratories participating in this project shall have training

programs that are equivalent to those requirements in the National Environmental Laboratory Accreditation Conference (NELAC) Standards, Section 5.0 Quality Systems. The laboratory shall have sufficient personnel with the necessary education, training, technical knowledge, and experience for their assigned functions. Data validation shall be under the direction of the Data Validation Task Manager who is experienced with the production, reporting, verification and validation of analytical data.

4.0 SAMPLING PROCEDURES

This section presents the sampling rationale, documentation methods, and sampling procedures, including sample labeling, sample preservation and holding times, sample custody tracking, and decontamination.

4.1 Sampling Rationale

The sampling that will be performed for solid materials such as:

- Used Sorbent Boom
- Oily Solids
- Oil/water mixtures
- Wastes generated by spill related activities (e.g., used oil, batteries, aerosol cans, etc)

The sampling that shall be performed various liquid and solid materials. Sampling procedures shall be conducted so that samples are representative of the media sampled and the resultant data can be compared to other data sets. The attached SOPs (Attachment 1 and 2) should provide a statistically meaningful number of field sampling points and the rationale for the collection of these samples. Where chemical levels may vary with location, enough samples should be collected to characterize the area. The attached SOPs (Attachment 1 and 2) shall be employed to implement the field investigation and sampling methods, including equipment requirements and decontamination procedures.

The weight/volume of the sample collected shall be sufficient to perform the analysis requested. Samples shall be stored in the proper types of containers and preserved in a manner for the analysis to be performed per laboratory guidelines. Personnel responsible for sampling shall change gloves between each sample collection/Management activity.

The sample containers shall be handled using gloves appropriate for the hazards involved with management of petroleum spill related samples (e.g., nitrile). The gloves serve two purposes, (1) personnel protection, and (2) prevention of sample cross-contamination. The gloves shall be replaced at a minimum between each sample collected or as frequently as needed.

4.2 Sample Containers and Equipment Decontamination

Each sample shall be collected with single-use or clean decontaminated equipment. To the maximum extent possible, BP field consultants shall utilize one-time use/dedicated equipment in order to avoid equipment decontamination during sample collection activities. If equipment reuse is necessary, decontamination shall be required to prevent contamination of clean areas and cross-contamination of samples and to maintain the health and safety of field personnel. Decontamination of all sampling equipment shall occur prior to sampling and between each sample location. Decontaminated sampling equipment and sample containers shall be maintained in a clean, segregated area. Appropriate equipment decontamination procedures

for field sampling equipment shall be followed according to Attachment 1 and 2. Equipment decontamination shall be completed in the following steps:

- Tap water and Alconox rinse with soft scrub brush
- Deionized water rinse
- Methanol rinse
- Deionized water rinse, three times
- Air dry

4.3 Sample Containers, Preservation, and Holding Times

Samples for chemical analyses shall be containerized and preserved in accordance with appropriate US EPA specifications. For each parameter, the required type of container, volume of sample, sample temperature, preservation, preparation holding times, and analytical holding times are specified on Tables 4-1. Sampling containers shall be provided by the laboratory. The sample containers provided shall be new, pre-cleaned I-Chem Series 300 or equivalent. Sample containers shall be shipped to the field team in custody-sealed containers under a Chain-of-Custody. Any shipping container with broken custody seals shall be considered potentially compromised and shall not be used. Samples shall be placed in individual pre-cleaned containers for shipment to the laboratory according to Attachment 4.

Sample containers provided by the laboratory shall be shipped with a packing list that details the number and type of bottles, the associated bottle lot numbers, and the packer's signature. The Chain-of-Custody records shall be completed by field sampling personnel and returned to the laboratory with the samples. After the cooler is sealed, sampling personnel shall attach two signed/dated custody seals to the outside of the cooler. One seal shall be placed on the right front of the cooler and the second seal shall be placed on the rear left side of the cooler.

Applicable samples shall be kept chilled from the time of collection until the time of analysis by the field team and the laboratory. Field team shall keep samples cold using ice and coolers, in which samples shall be stored until delivery to the analytical laboratory personnel. The laboratory shall supply a temperature blank bottle for each shipping container to determine if the temperature of the samples was maintained properly during transit. After receipt of the samples, it is the laboratory's responsibility to store the applicable samples (see Table 4-1) at $\leq 6°C$ until preparation and analysis has been initiated.

Sample holding times specified on Tables 4-1 must be met or data will be qualified as estimated or rejected depending the magnitude of holding time exceedance. The holding times for required analyses are measured from the verified time of sample collection. When possible, samples shall be shipped by overnight carrier or delivered by same-day carrier to minimize the time between collection and laboratory receipt.

Upon sample receipt at the designated laboratory, the condition of the custody seals, sample collection dates, and sample temperature shall be noted by the Laboratory Sample Custodian. In addition, the laboratory shall document whether or not wet ice was present when samples were received. The required date for completion of analysis (or extraction) shall be noted and

keyed to the holding time. The Laboratory Project Manager shall be responsible for ensuring proper execution of required analyses. The Field Consultant shall be responsible for ensuring that laboratory personnel is kept informed of any schedule changes that affect the number of samples and expected receipt of samples at the laboratory.

4.4 Field Equipment

A variety of field equipment shall be utilized for the screening activities addressed in this QAPP. A summary of the sampling equipment follows.

General Sampling equipment and supplies:

- QAPP.
- Applicable project-specific SOPs.
- Field Consultant HASP.
- Contact numbers, addresses.
- Personal protective equipment.
- Work gloves.
- Disposable gloves.
- First-aid kit.
- Camera.
- Hand-held GPS.
- Field logbook.
- Indelible-ink pens.
- Calculator.
- Tools.
- Decontamination equipment.
- Alconox or equivalent phosphate-free detergent.
- Reagent grade methanol.
- Deionized water.
- Cooler.
- Ice.
- Chain-of-Custody forms and custody seals.
- Appropriate packaging materials (*e.g.*, bubble wrap and tape).
- Sealable plastic storage bags.
- Plastic sheeting.
- Buckets.
- Trash bags.
- Paper towels.

Waste sample collection equipment and supplies:

- Shovels.
- Stainless steel scoops, spatulas, knives.
- Stainless steel mixing bowls.

- Sample containers.
- Drum thief, or equivalent.

The Field Consultant shall inspect equipment to ensure its proper working condition prior to the start of each working day. Field equipment shall be properly protected against inclement weather conditions during the field work. At the end of each working day, field equipment shall be properly decontaminated, taken out of the field, and appropriately placed for overnight storage. To the extent possible, the field team shall utilize single-use disposable sample collection equipment.

4.5 Sample Identification, Documentation, and Custody

Field sampling personnel are responsible for the collection, description, documentation, labeling, packaging, storage, Management, and shipping samples obtained in the field (Attachment 4*)*. Appropriate practices are necessary to ensure sample integrity from collection through laboratory analysis and data reporting.

4.5.1 Sample Identification

Sample labeling and identity establishment are of critical importance in the collection of samples. Data for a sample shall be keyed to the sample's unique sample designation. This sample designation, which shall be used on sample containers and associated field data forms, shall be used for data recall from the database system. Individual samples are assigned a unique date-referenced identification number as defined below and detailed in Attachment 5.

- (Matrix Code)-(Date)-(Team Code or Vessel Code)-(Sequential #)
- (Matrix Code) – Field sample matrix code as identified in the Project Nomenclature Codes Table
- (Date) – The date the sample was collected in YYYYMMDD format.
- (Team Code or Vessel Code) – An alphanumeric string consisting of team identification code or the cruising vessels description code. (The length of the string should be succinct so that the string is both descriptive and is able to fit on the COC form and the bottleware label).
- (Sequential #) – A number which is advanced when the same team (or vessel code) collects samples on the same day, going to separate laboratories.
- Example: "SW-20100608-RAT2-01

Each sample container shall be clearly labeled, as soon as possible, after collection. At a minimum, the following information shall be written, using permanent ink, on a waterproof sample label:

- The unique sample identification number.
- Time and date of collection.
- BP Deep Water Horizon Response Waste Sample.
- Project number.
- Analytical Request Form (ARF) number.

- Chain-of-Custody number.
- Required analysis.

4.5.2 Sample Custody

Chain-of-Custody (COC) procedures shall be used to ensure proper Management of samples during sampling and analysis and to provide sample tracking (Attachment 5). Samples and sample documentation shall be maintained in the physical possession of authorized personnel or under control in a secure area. The purpose of sample custody procedures is to document the history of samples from the time of sample collection through shipment, analysis, and disposal. A sample is considered to be in one's custody if one or more of the following conditions apply:

- The sample is in an individual's actual possession.
- The sample is in view after being in an individual's physical possession.
- The sample is locked up so that no one can tamper with it after having been in an individual's physical possession.

4.5.3 Sample Custody in the Field

A Chain-of-Custody form shall be filled out upon sample collection. At a minimum, the following information shall be written on the COC form:

- Sample identification number.
- Time and date of collection.
- Sample matrix.
- Number of sample containers.
- COC number.
- ARF number,
- Required analyses.
- Requested analytical turn-around-time.
- Any additional information the laboratory must know to perform the requested analysis, such as holding time, filtering require, *etc*.

The following Chain-of-Custody procedures shall be followed for samples submitted to the laboratory for chemical and physical properties analyses:

- Each individual field sampler is responsible for the care and custody of samples he/she collects until the samples are properly transferred to temporary storage or are shipped to the laboratory.
- A Chain-of-Custody form shall be completed by the sampler for samples collected and submitted to the laboratory.
- After the cooler is sealed, two custody tape seals shall be affixed to the cooler (as described in Section 4.3) prior to delivery pickup by the overnight courier.

- Each time the samples are transferred, the signatures of the person relinquishing and the person receiving the samples, as well as the date and time of transfer, shall be documented.
- A copy of any carrier air bill shall be retained as part of the permanent Chain-of-Custody documentation.
- Laboratory personnel shall record the condition of the sample containers and the temperature upon receipt.
- Changes or corrections to the information documented by the Chain-of-Custody form (including, but not limited to, field sample identify or requested analyses) must be dated and initialed by the person requesting the change. If the request is by the Field Consultant, a copy of the Chain-of-Custody form shall be revised, initialed, and forwarded to the laboratory and shall supersede the original Chain-of-Custody form.
- The original Chain-of-Custody form and any documented changes to the original shall be included as part of the final analytical report. This record shall be used to document sample custody transfer from the sampler to the laboratory and shall become a permanent part of the project file.

4.5.4 Sample Custody in the Laboratory

The following subsections describe the Chain-of-Custody procedures associated with sample receipt, storage, tracking, and documentation to be followed by the laboratory.

4.5.4.1 Sample Receipt

The Laboratory Sample Custodian shall be responsible for samples received at the laboratory. The Laboratory Sample Custodian shall be familiar with custody requirements and the potential hazards associated with environmental samples. In addition to receiving samples, the Laboratory Sample Custodian shall also be responsible for documenting sample receipt, storage before and after sample analysis, and the proper disposal of samples. Upon sample receipt, the Laboratory Sample Custodian is responsible for the following activities:

- Inspect the sample containers for integrity and ensure that custody seals are intact on the shipping coolers. The temperature of the samples upon receipt and presence of leaking or broken containers shall be noted on the Chain-of-Custody/sample analysis request forms.
- Sign (with date and time of receipt) the Chain-of-Custody/sample analysis request forms, thereby assuming custody of the samples, and assign the laboratory sample identification numbers.
- Compare the information of the Chain-of-Custody/sample analysis request forms with the sample labels to verify sample identity. Any inconsistencies shall be resolved with a field sampling representative before sample analysis proceeds.
- Store samples in at $\leq 6^{\circ}$ C.

4.5.4.2 Sample Storage

Analytical samples shall be stored in a locked refrigerator maintained at ≤ 6° C. The temperature shall be monitored and recorded daily, at a minimum; temperatures shall be recorded in a bound logbook that is archived by laboratory personnel.

4.5.4.3 Sample Tracking

Each sample shall receive a unique laboratory sample identification number at the laboratory when the sample is logged into the laboratory computer system.

The laboratory shall utilize a sample TCLP preparation, extraction, and digestion record to document procedures being performed. Laboratory data shall be entered on the sample extraction form and permanently recorded in a laboratory logbook.

Laboratory personnel shall maintain a sample tracking system that documents the following:

- Organization/individual who performed sample analyses.
- Date of sample receipt, extraction (if applicable), and analysis.
- Sample holding times.
- Names of analysts.
- Sample preparation procedures.
- Analytical methods used to analyze the samples.
- Calibration and maintenance of instruments.
- Deviations from established analytical procedures, if applicable.
- QC procedures used to ensure that analyses were in control during data generation (instrument calibration, precision checks, method standards, method blanks, *etc.*).
- Procedures used for the calculation of precision, accuracy, and method detection limits (MDLs) for the reported data.
- Statement of quality of analytical results.

4.6 Sample Documentation and Records

After sample collection and before proceeding to the next sampling point, field sampling personnel shall complete the Chain-of-Custody record and all appropriate forms and/or logbook entries.

A field logbook shall be maintained by a field team member to record information pertinent to daily activities, the field sampling program, and the equipment preparation efforts. Field logbooks shall be bound, with pages sequentially numbered. Entries shall be made in permanent, waterproof ink. The Field Team Leader shall review field log entries daily and shall initial each page of entries. Field logbooks shall be transferred to the project files at the end of field activities to provide a record of sampling. The following sections describe the documentation of field records.

4.6.1 Field Logbook and/or Field Forms

Field logbooks may be in hardcopy or electronic form. A separate entry shall be made for each sample collected. At a minimum, the following information shall be recorded in a field logbook or on the Chain-of-Custody using indelible ink.

- Sample identification number.
- Time and date of collection.
- Sample matrix.
- Number of sample bottles.
- Project name.
- Required analyses.
- Odors or visual observations
- Any deviations from QAPP and/or the attached SOPs.
- Sample location and coordinates (as appropriate).
- Method of sample collection.
- General comments (*e.g.*, weather conditions).
- Names of all sampling personnel.
- Any deviations from established protocols or work instructions during sample collection.

4.6.2 Corrections to Documentation

Corrections to the Field Logbook shall be made by drawing a line through the incorrect entry and writing the correct entry. The person making the correction shall date and initial the correction. There shall be no erasures or obliterated entries in the field logbooks.

5.0 ANALYTICAL PROCEDURES

Routine analytical services are performed using standard US EPA-approved methodology. Non-standard methods are not anticipated for the scope-of-work described in this QAPP.

Table 3-1 present the analytical methods, reporting limits, accuracy and precision goals for aqueous samples and soil samples, respectively. The reporting limits on Tables 3-1 are presented for reference only and represent approximate reporting limits for relatively clean samples without matrix interferences. The US EPA methods listed on Tables 3-1 and 3-2 are contained in the most current versions of the *Test Methods for Evaluating Solid Waste* (SW-846).

5.1 Laboratory Analysis

To maintain a consistent data-reporting technique, non-detected results shall be presented with a “U” qualifier after the applicable laboratory reporting limit.

BP has established a standard turn-around-time for samples from BP of 5 calendar days after the date of sample collection.

5.1.1 Analytical Methods

As part of the characterization, solid waste samples shall be characterized for disposal. Samples collected as part QAPP shall be analyzed for the constituents specified on Tables 3-1.

6.0 CALIBRATION PROCEDURES

This section provides the requirements for calibration of measuring and test equipment/instruments used in laboratory analysis. The calibration procedures stipulated in this QAPP are designed to ensure that laboratory instrumentation is calibrated to operate within manufacturer specifications and that the required traceability, sensitivity, and precision of the equipment/instruments are maintained. Measurements that affect the quality of an item or activity shall be taken only with instruments, tools, gauges, or other measuring devices that are accurate, controlled, calibrated, adjusted, and maintained at predetermined intervals to ensure the specified level of precision and accuracy.

All calibration measurements and maintenance records shall be documented so that data can be verified and validated during an audit. All documentation shall be maintained for the duration of activities associated with this QAPP.

6.1 Field Instrument Calibration and Procedures

It is anticipated that the field team shall not be utilizing instruments that shall require calibration for the collection of liquid and solid waste samples.

If field instruments are utilized, they shall be properly protected against inclement weather conditions during the field investigations. At the beginning of each working day, field instruments shall be fully charged and calibrated according to method and manufacturer specifications. At the end of each working day, field instrument probes shall be properly decontaminated, taken out of the field, and placed in a cool, dry room for overnight storage and charging.

6.2 Laboratory Instrument Calibration

Instruments and equipment used in the laboratory shall be controlled by a formal calibration program. The program shall verify that the equipment has the proper calibration range, accuracy, and precision to generate data comparable with specific requirements. All calibration shall be performed by laboratory personnel experienced in the referenced methods for the analysis of project samples for the constituents of concern.

The laboratory shall provide all data and information to demonstrate that the analytical system was properly calibrated at the time of analysis, including calibration method, required frequency, and source of standards, response factors, linear range, check standards and applicable control limits, as part of the data deliverables.

Before any instrument is used as a measuring device, the instrument's response to reference materials must be determined. The manner in which various instruments are calibrated is dependent on the particular type of instrument and its intended use. Preparation of reference materials used for calibration shall be documented in a laboratory notebook.

The two types of laboratory instrument calibration are initial calibration (including a second source initial calibration verification) and continuing calibration verification. Initial calibration procedures establish the calibration range of the instrument. Typically, multiple analyte concentrations are used to establish the initial calibration range and calibration data. The laboratory evaluates the resulting calibration data as detailed in the analytical methods.

Continuing calibration verification usually measures the instrument's response to fewer calibration standards and requires instrument response to fall within certain limits (*e.g.,* 20%) of the initial measured instrument response. Continuing calibration verification may be used within an analytical sequence to verify stable calibration throughout the sequence and/or to demonstrate that instrument response did not drift during a period of non-use of the instrument. The laboratory evaluates the resulting continuing calibration data as detailed in the analytical methods.

6.2.1 Balances

Laboratory balances shall be calibrated and serviced annually by a certified external contractor. In addition, the analyst shall check the balance daily before use. A record of calibrations and daily checks shall be maintained in the balance log.

6.2.2 Thermometers

Oven and refrigerator thermometers shall be calibrated annually against a NIST-certified thermometer in the range of interest. Annual calibrations shall be recorded in a calibration notebook. Daily oven and refrigerator readings shall be recorded.

6.3 Records

Records shall be maintained as evidence of required calibration frequencies, and equipment shall be marked suitably to indicate calibration status. If marking on the equipment is not possible, records traceable to the instrument shall be readily available for reference.

7.0 PREVENTIVE MAINTENANCE

7.1 Field Equipment

As discussed in Section 6.0 of this QAPP, it is anticipated that field instruments shall not be required. If field instruments are utilized, the field instruments shall be properly protected against inclement weather conditions during the field investigation. At the end of each working day, field equipment shall be taken from the field and appropriately stored overnight. Field instrumentation and equipment maintenance repair, and calibration procedures shall be in accordance with manufacturer specifications.

7.2 Laboratory Equipment

The ability to generate valid analytical data requires that analytical instrumentation be properly maintained. The laboratory shall be responsible for appropriate maintenance for major instruments. The following four elements of an effective maintenance program are identified and discussed in the following subsection:

- Instrument maintenance logbooks.
- Instrument maintenance and repair.
- Available spare parts.
- Contingency plans.

7.2.1 Instrument Maintenance Logbooks

Each analytical instrument shall be assigned an instrument logbook. Maintenance activities shall be recorded in the instrument logbook and the information entered shall include:

- Date of service
- Person performing
- Type of service performed and reason for service
- Replacement parts installed (if applicable)
- Miscellaneous information

If service is performed by the manufacturer or its representative, a copy of the service record shall be inserted into the page facing the logbook page where the above cited-information has been entered.

7.2.2 Instrument Calibration and Maintenance

An overview of the routine calibration procedures used for analytical instrumentation is presented in Section 6.0. Preventive maintenance and calibration by manufacturer service representatives shall be provided on a routine basis as required based on the instrument type.

In addition to maintenance by manufacturer service representatives, procedures for routine maintenance in accordance with manufacturer specifications for each analytical instrument shall be followed by the laboratory. This shall include maintaining inventories of spare parts used routinely (*e.g.*, vacuum pumps and filaments for GC/MS and spare torches for ICP/MS). Instrument operators have the responsibility to ensure that an acceptable inventory of spare parts is maintained.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

Data validation is a process used to determine if data are accurate, complete, or meet specified criteria (ANSI, 2000). Data validation objectives are as follow:

- Produce data with values that are validated and of a known quality.
- Evaluate the internal, spatial, temporal, and physical consistency of the data.
- Inter-compare data to identify errors, biases, or outliers.

The data validation process shall consist of data generation, reduction, and review of both field data and laboratory analytical data. The results of the validation shall be included with the original hardcopies of the data and shall be maintained in the project file. The data shall be included in the BP EQuIS® database.

8.1 Field and Technical Data

The field (non-laboratory) data that shall be collected during the field effort can generally be characterized as either "objective" or "subjective" data. Objective data include direct measurements of field data such as field screening/analytical parameters and water-level measurements. Subjective data include descriptions and observations such as descriptions of sampling locations and conditions and physical descriptions of solid samples.

8.1.1 Data Reduction

Data shall undergo field QA review and a subsequent technical review after entry into the data management system. Subjective data shall be filed as hardcopies for subsequent review and incorporation into technical reports, as appropriate.

The subjective data shall be formatted into a usable medium, such as a BP EQuIS® database program. The database shall allow for the generation of summary tables, graphs, and figures while maintaining the integrity and accountability of the original data.

8.1.2 Laboratory Data QA Review

The QA review for usability of objective field and technical data shall be performed at two levels. For the first level, data shall be reviewed at the time of collection by following standard procedures and QC checks. For the second level, after data reduction to table format or arrays, the data shall be reviewed for anomalous values. Any inconsistencies or anomalies identified by this review shall be immediately resolved, if possible, by seeking clarification from the field personnel responsible for collecting the data. Inconsistencies and anomalies shall be documented during the validation process.

Subjective field and technical data shall be approved for use by review of field reports for reasonableness and completeness. In addition, random checks of sampling and field conditions shall be made to check recorded data at that time to confirm the recorded observations. When

possible, peer review also shall be incorporated into the data QA review process, particularly for subjective data, to maximize consistency among field personnel.

8.2 Laboratory Data Documentation

The laboratory shall retain records of the analytical data and project files for a minimum of 7 years from the date of the report (as required by NELAC). BP must be advised 3 months before any data is purged and given the opportunity to take custody of said document.

8.2.1 Data Reduction

Data reduction is performed by the individual analysts and consists of calculating concentrations in samples from the raw data obtained from the measuring instruments. The complexity of the data reduction shall be dependent upon the specific analytical method and the number of discrete operations (*i.e.*, digestions, dilutions, and levels/concentrations) involved in obtaining a sample that can be measured.

For those methods using a calibration curve, sample response shall be applied to the linear regression line to obtain an initial raw result, which shall then be factored into equations to obtain the estimate of the concentration in the original sample. Rounding shall not be performed until after the final result has been obtained to minimize rounding errors; results shall not normally be expressed in more than three significant figures.

Copies of raw data and calculations used to generate the final results shall be retained on file to allow reconstruction of the data reduction process at a later date.

8.2.2 Laboratory Data Review

System reviews are performed at all levels. The individual analyst constantly reviews the quality of data through calibration checks, QC sample results, and performance evaluation samples. These reviews are performed prior to submission to the Laboratory Project Manager.

Criteria for analytical data review/verification include checks for internal consistency, transmittal errors, laboratory protocol, and laboratory QC. QC sample results and information documented in field notes shall be used to interpret and evaluate laboratory data. The laboratory QA personnel shall independently conduct a complete review of selected reports to confirm analytical results.

The laboratory shall complete data verification procedures, including:

- Verifying analyses requested were analyses performed.
- Preliminary data proofing for anomalies - investigation and corrections, where possible.
- Reviewing laboratory data sheets for detection limits, holding times, surrogate recovery performance, and spike recovery performance.
- Double-checking computerized data entry, if applicable.

The Laboratory Project Manager shall review data for consistency and reasonableness with other generated data and determine whether project requirements have been satisfied. Selected hardcopy output of data (chromatograms, spectra, integrations, *etc.*) shall be reviewed to ensure that results are interpreted correctly. Unusual or unexpected results shall be reviewed, and a determination shall be made as to whether the analyses should be repeated. In addition, the Laboratory Project Manager may recalculate selected results to verify the calculation procedure.

The Laboratory QA Coordinator shall independently conduct a complete review of the Project data to determine whether laboratory and this QAPP's analytical requirements have been met. Discrepancies shall be reported to the Laboratory Project Manager for resolution.

Prior to final review/signoff by the Laboratory Project Manager, the laboratory personnel shall verify that the report deliverable is complete and in proper format, screen the report for compliance to laboratory and QAPP requirements, and ensure that the Case Narrative addresses any noted deficiencies. The Laboratory Project Manager shall perform the final laboratory review prior to reporting the results to Field Consultant Project Manager.

8.2.3 Data Reporting/Deliverable Package

The laboratory shall be responsible for providing an approved electronic data deliverable (EDD) as well as analytical reports in hardcopy format. The deliverable package shall contain final results (uncorrected for blanks and recoveries), analytical methods, reporting limits, surrogate recovery data, method blank data, and results of QC samples (where applicable). In addition, special analytical problems and/or any modifications of referenced methods shall be noted. The number of significant figures reported shall be consistent with the limits of uncertainty inherent in the analytical method. Data are normally reported in units commonly used for the analyses performed. The data shall be reported in the data package formats specified in Attachment 6 and in the EDD format specified in Attachment 7.

QC results reported shall include a method blank, MS samples, laboratory duplicate samples, and field QC samples, in addition to LCSs. Sample data results (including QC sample results) shall also be entered into the program data management system. The laboratory is responsible for reviewing the electronic data to ensure that these data are consistent with the hardcopy reports.

8.3 Data Review and Validation

The purpose of analytical data validation is to qualify data due to data quality limitations and to identify data reduction errors. In addition to the laboratory QA review, the fully documented data packages shall be evaluated by the Data Validator for the following:

- Compliance, including attaining proper laboratory reporting limits as listed on Table 3-1.
- Completeness.
- Confirmation of receipt of requested items.

Data verification and validation shall be performed in accordance with the Guidelines for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (US EPA, January 2009). Data shall be evaluated and qualified as necessary if all identification criteria were not met and if the QC acceptance criteria outlined in the specific analytical methods or laboratory-generated performance-based control limits are not met. Current performance-based control limits shall be provided as part of the analytical deliverables. Data may also be qualified as "not-detected" based on concentrations of target analytes detected in the associated blank analyses. A maximum of 80% of the data shall undergo a Stage 2A validation and a minimum of 20% of the data shall undergo a Stage 4 validation with guidance from the National Functional Guidelines for Organic Data Review (US EPA, October 1999) and National Functional Guidelines for Inorganic Data Review (US EPA, July 2002). The data validation qualifiers presented below shall be used for all project samples.

- Organic Data Qualifiers

U	This compound should be considered "not detected" because it was detected in the field/equipment blank, trip blank, or laboratory method blank at a similar level.
J	Quantitation is approximate due to limitations identified during data validation.
R	Unusable result; analyte may or may not be present in sample.
UJ	This analyte was not detected, but the reporting limit may or may not be higher due to a bias identified during data validation.

- Inorganic Data Validation Qualifiers

U	This result should be considered "not detected" because it was detected in a rinsate blank or laboratory blank at a similar level.
R	Unusable result; analyte may or may not be present in sample.
J	Quantitation is approximate due to limitations identified during data validation.
UJ	This analyte was not detected, but the reporting limit may or may not be higher due to a bias identified during data validation.

8.4 Data Management

Data will be managed in accordance with the Unified Command Deepwater Horizon Data Management Plan for the BP MC252 Incident (BP-MC252-DMP, June 14, 2010). A copy of the Chain-of-Custody shall be delivered to the Field Consultant for inclusion in project files. Upon receipt and log-in of the samples at the laboratory, the remaining sections of the field Chain-of-Custody (*e.g.*, description of the sample condition at the time of receipt, assigned laboratory batch number, laboratory identification number, and any special conditions) shall be noted on the field Chain-of-Custody. The laboratory shall document discrepancies, and the field BP Project Manager shall be notified. The Chain-of-Custody and ARF information shall be initially keyed into and maintained in the laboratory's database. A copy of the laboratory's Chain-of-Custody information, referred to as a sample receipt confirmation (SRC), shall be sent to the BP Project Manager following sample log-in for verification of properly entered handwritten Chain-of-Custody requests and information such as sample identification numbers, analyses requested, and the quantity of samples. In cases of discrepancies between the field Chain-of-

Custody and the SRC, the appropriate revisions shall be communicated to the laboratory for the Chain-of-Custody corrections. Corrected information on the field Chain-of-Custody shall be recorded into the program data management system.

The samples received by the designated laboratory shall be analyzed following internal laboratory QC procedures. The laboratory EDD shall be provided following sample analysis. If any required information is missing or if database fields are inappropriately filled, the laboratory shall be notified and shall provide a corrected EDD.

8.5 Data Archival

Applicable electronic field and laboratory data collected from the Sites during sampling shall be archived electronically for a period of 7 years at the laboratory. BP must be advised a minimum of 3 months prior to any data being purged and given an opportunity to take custody of said data. Backup tapes containing databases and programs or software utilities shall be maintained in a secure location. Both the field consultant and laboratory shall perform daily and weekly tape backups of electronic media.

9.0 PERFORMANCE AND SYSTEM AUDITS

The primary objective of performance and system audits is to ensure that the established QA/QC procedures are properly implemented. Audit documentation shall be maintained in the project file.

9.1 Performance Audits

Performance audits are quantitative evaluations of data quality produced by a particular activity or function. At the direction of the BP Project Manager, performance audits of the laboratories shall be conducted through the submission and analysis of single- or double-blind performance evaluation samples. The QAOM shall coordinate the manufacture and submission of performance audit samples to the laboratories. A US EPA-approved performance test provider shall be used to obtain the performance evaluation samples.

9.2 System Audits

A systems audit entails an on-site evaluation of the designated laboratory and/or on-site evaluation of the field sampling activities of the field consultant for compliance with the QAPP and SOPs. At the direction of the BP Project Manager, system audits shall be conducted. Prior to conducting an on-site audit, the auditor should review the findings of previous audits and examine procedures and records. These on-site audits shall also include verification of effectiveness of implemented corrective actions. On-site audits shall be performed by the Laboratory Auditors or Field Auditors.

The system audits shall address both field and laboratory activities, including a review of personnel qualifications, equipment, documentation, sampling techniques, analytical methods, and adherence to QA/QC procedures. The laboratory has its own Quality Assurance Plan; therefore, the laboratory audit activities under this QAPP shall entail a general review of laboratory quality assurance practices. The Field Auditor shall witness field operations during an audit; however, witnessing laboratory operations on specific field samples is not required.

9.3 Audit Report

Audit findings shall be submitted, in writing, to the BP Project Manager for review. Each audit report should summarize scope and results of the audit. In the event that inadequacies are identified, corrective actions shall be described.

10.0 INTERNAL QUALITY ASSURANCE/QUALITY CONTROL

10.1 Field Analysis

The Field Team shall not be performing field analysis for this project.

10.2 Laboratory Analysis

Internal laboratory QC checks shall consist of the following:

- Instrument performance checks.
- Instrument calibration.
- Retrieval of documentation pertaining to instrument standards, samples, and data.
- Documentation of sample preservation, transport and analytical methodology.
- Analysis of QC samples (discussed in Subsection 3.3).
- Meeting the specific method requirements.

10.3 Reporting Checks

After validated laboratory data have been made available, the data shall be compiled into tables to facilitate the assessment of results. An independent check of the data entered into these tables shall be performed for accuracy and completeness, and corrections shall be made as addressed and discussed in Subsections 3.0 and 8.0.

11.0 FEEDBACK AND CORRECTIVE ACTION

11.1 Feedback Mechanism

There are mechanisms within the project structure that allow for the identification, feedback, and control of any nonconformance or deficiency. In general, the technical personnel involved with the project are responsible for reporting suspected technical nonconformance through standard communication channels established by the organizational structure. In the same manner, project personnel are responsible for reporting suspected QA nonconformance.

11.2 Corrective Action

Corrective action may be initiated under several situations. All personnel involved in the environmental project are responsible for identifying the need for corrective actions. The person who identifies the problem shall immediately notify the person who is responsible for the activity.

Before re-sampling is initiated to correct a problem, the data user should evaluate the project completeness goals. If the goals are met and a sufficient amount of data was obtained, then re-sampling may not be necessary and improper/inconsistent data may be rejected.

When a problem is not quickly resolved or has a cost effect, the BP Project Manager, Field Consultant Project Manager, and QAOM should be notified. Data quality problems that cannot be resolved may need to be reported with qualifying statements.

During performance and systems audits, the Laboratory or Field Auditor may find deficiencies in personnel qualifications, instrumentation, or documentation. Problems with existing procedures may be identified through audits or field observations. The Laboratory or Field Auditor should review documented QA problems and verify that corrective actions were completed. Existing deficiencies shall be documented by the Auditor and resolved by the personnel responsible for the activity.

11.2.1 Field Activities

Field personnel have the initial responsibility to monitor the quality of field measurements and observations. The Field Consultant is responsible for verifying that QC procedures are followed. This responsibility requires the Field Consultant to assess the correctness of field methods and the ability to meet QA objectives. If a problem occurs that might jeopardize the integrity of the project or that might cause a specific QA objective to not be met, the Field Consultant shall notify the QAOM. An appropriate corrective action shall then be determined and implemented. The Field Consultant shall document the problem, the corrective action, and the results. Copies of the documentation form shall be provided to the Field Consultant, QAOM, and BP Project Manager.

Field auditing is a recognized technique for evaluating the performance of field teams and assessing how field team performance may affect data quality. At the direction of the BP

Project Manager, a field audit during the collection of samples shall be conducted by the Field Auditor to ensure that sampling, Management, and transportation to the laboratory procedures meet QA/QC protocols and that field documentation is sufficient to produce data of satisfactory quality; to provide a "defense" in the event that field procedures are called into question; and to identify ways to reduce sampling costs.

11.2.2 Laboratory Corrective Action

The laboratory has the responsibility to monitor the quality of the analytical system. The laboratory shall verify that QC procedures are followed and that the results of QC samples are within the acceptance criteria. This verification requires that the laboratory assess the correctness of the following items:

- Sample preparation procedure.
- Initial calibration and initial calibration verification (ICV).
- Continuing calibration verification.
- Method blank result.
- LCS/LCSD samples.
- Surrogate recoveries.
- Internal standard performance.

If the assessment reveals that the QC acceptance criteria are not met, the laboratory must immediately evaluate the analytical system and correct the problem. The analyst shall notify the Laboratory QA Coordinator of the problem and, if possible, shall identify potential causes and suggest corrective action.

The nature of the corrective action obviously depends on the nature of the problem. For example, if a continuing calibration verification is determined to be out-of-control, the corrective action may require recalibration of the analytical system and reanalysis of all samples analyzed since the last acceptable continuing calibration standard.

When the appropriate corrective action measures have been defined and the analytical system is determined to be "in control," the analyst shall document the problem, the corrective action, and the data demonstrating that the analytical system is in control. Copies of the documentation shall be provided to the Laboratory QA Coordinator.

Data generated concurrently with an out-of-control system shall be evaluated for usability relative to the nature of the deficiency. If the deficiency does not impair the usability of the results, data shall be reported and the deficiency shall be addressed in the Case Narrative. If sample results are impaired, the Laboratory Project Manager shall be notified and appropriate corrective action (*e.g.*, reanalysis) shall be taken

12.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Communication among BP, the laboratory, Field Consultants, and personnel is important to ensure that problems are remedied and that solutions are documented in an informed and timely manner.

At least once a year, the QAOM should assess and prepare a QA report for the BP Project Manager. This QA report shall include significant unresolved QA problems and recommended solutions. The report should also discuss resolved problems and the corrective actions taken since the last management report. The BP Project Manager is responsible for ensuring that QA problems identified in the QA reports are resolved.

Upon completion of a performance and systems audit, the QAOM shall submit an audit report to the BP Project Manager. This audit report should include a list of observed field activities, a list of reviewed documents, and any observed deficiencies. In the event that inadequacies are identified, corrective actions shall be undertaken as outlined in Section 10.0.

12.1 Field Quality Assurance Reports

The Field Team Leader shall provide the Field Consultant Project Manger with daily field progress reports. The Field Consultant Project Manager or Field Team Leader shall immediately notify the QAOM and BP Project Manager about field QA situations that require corrective action.

12.2 Laboratory Quality Assurance Reports

The Laboratory QA Coordinator shall provide periodic, routine summary reports specific to the project to the BP Project Manager. These reports summarize QA activities for the reporting period, including results of system audits (external and internal), summaries of corrective action to remedy out-of-control situations, and recommendations for revisions of laboratory procedures to improve the analytical systems. The Laboratory QA Coordinator shall notify the QAOM and BP Project Manager about situations that appear to systematically impact data quality.

12.3 Laboratory Data Submittals

The hardcopy data packages shall summarize the deviations from approved protocols and significant data findings in the Case Narratives. The laboratory shall submit the EDD to BP via electronic mail address MC252_EDD@envstd.com. The laboratory shall submit Adobe images of the Sample Confirmation Receipts/Chain-of-Custody Records and BP Limited Data Package to BP via electronic mail address MC252_Deliverables@envstd.com. The laboratory shall supply one hardcopy BP Full Data Package and two indexed Adobe images of the BP Full Data Package on CDs to BP via the address specified below.

MC252 DV Task Manager
c/o Environmental Standards, Inc.
1140 Valley Forge Road
Valley Forge, PA 19482-0810

13.0 REFERENCES

American National Standards Institute/American Society for Quality Control *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs (E4-1994).* American National Standard. (ANSI, 1995).

Contract Laboratory Program National Functional Guidelines for Organics Data Review. US EPA. October 1999 version (US EPA, 1999).

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Guidance for Data Quality Assessment, Practice Methods for Data Analysis, EPA QA/G-9. US EPA. July 2000 (US EPA, 2000).

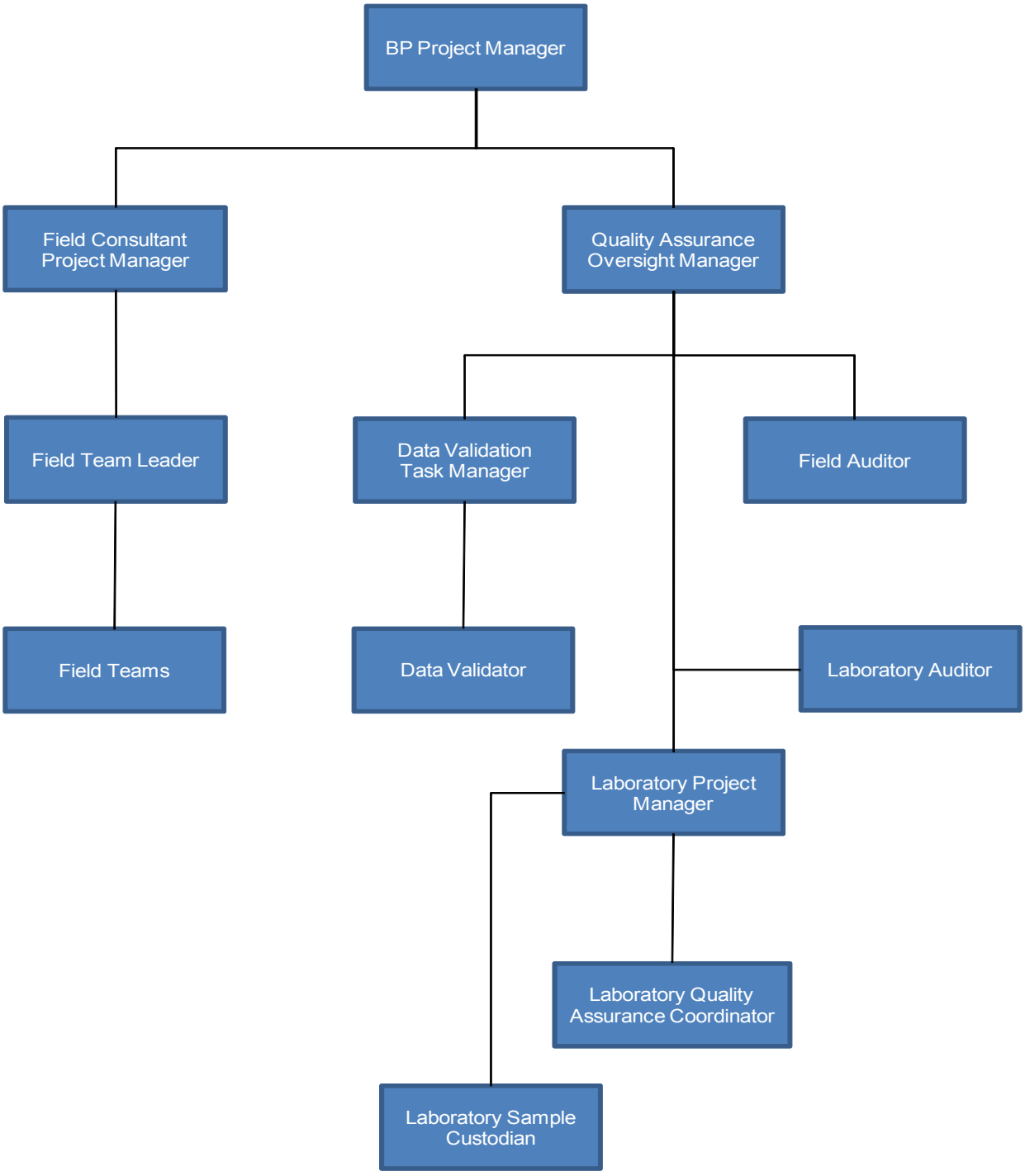
Title 40 Part 261.21 Characteristic of Ingitability. US EPA. January 1991. Code of Federal Regulations (40 CFR Part 261.21).

Title 40 Part 261.22 Characteristic of Corrosivity. US EPA. January 1991. Code of Federal Regulations (40 CFR Part 261.22).

Title 40 Part 261.24 Toxicity Characteristic. US EPA. January 1991. Code of Federal Regulations (40 CFR Part 261.24).

FIGURE 2-1

FIGURE 2 - 1
Project Organization Chart



TABLES

Table 3-1
Waste and TCLP Leachate Samples[a]
Analytical Methods, Reporting Limits, Accuracy, and Precision Goals[b]

Parameter	Analytical Method	Laboratory Reporting Limit (µg/L)	MS Accuracy (%)	Precision, RPD (%)[c]	LCS Accuracy
1,1-Dichloroethene	SW846 8260C	100	32 – 164%	20%	46 – 152%
1,2-Dichloroethane	SW846 8260C	100	56 – 150%	20%	58 - 144%
2-Butanone (MEK)	SW846 8260C	200	10 – 184%	20%	11- 169%
Benzene	SW846 8260C	100	54 – 141%	20%	63 – 133%
Carbon tetrachloride	SW846 8260C	100	49 – 146%	20%	54 – 144%
Chlorobenzene	SW846 8260C	100	67 – 136%	20%	69 -131%
Chloroform	SW846 8260C	100	64 – 138%	20%	68 – 132%
Tetrachloroethene	SW846 8260C	100	43 – 161%	20%	52 – 159%
Trichloroethene	SW846 8260C	100	57 – 144%	20%	67 – 134%
Vinyl chloride	SW846 8260C	100	29 – 152%	20%	37 – 149%
Arsenic	SW846 6010C	200	75 – 125%	20%	87 – 116%
Barium	SW846 6010C	2000	75 – 125%	20%	89 – 119%
Cadmium	SW846 6010C	100	75 – 125%	20%	87 – 116%
Chromium	SW846 6010C	200	75 – 125%	20%	87 – 115%
Lead	SW846 6010C	200	75 – 125%	20%	88 – 117%
Mercury	SW846 7470A	0.2	75 – 125%	20%	80 – 120%
Selenium	SW846 6010C	200	75 – 125%	20%	88 – 117%
Silver	SW846 6010C	200	75 – 125%	20%	77 – 124%
Flashpoint	SW846 Chapter 7	Ambient (°F)	NA	NA	78 – 83 (°F)
Paint Filter Test	SW846 9095B	Pass/Fail	NA	NA	NA

Table 3-1 (Cont.)
Waste Samples and TCLP Leachates[a]
Analytical Methods, Reporting Limits, Accuracy, and Precision Goals[b]

Parameter	Analytical Method	Laboratory Reporting Limit (µg/L)	MS Accuracy (%)	Precision, RPD (%)[c]	LCS Accuracy
1,4-Dichlorobenzene	SW846 8270D	100	35 – 110%	20%	45 – 110%
2,4,5-Trichlorophenol	SW846 8270D	250	34 – 144%	20%	44 – 110%
2,4,6-Trichlorophenol	SW846 8270D	100	33 – 140%	20%	43 – 110%
2,4-Dinitrotoluene	SW846 8270D	100	33 – 128%	20%	49 – 124%
2-Methylphenol(*o*-Cresol)	SW846 8270D	100	10 – 126%	20%	46 – 110%
3&4-Methylphenol	SW846 8270D	100	38 – 128%	20%	45 – 117%
Hexachloro-1,3-butadiene	SW846 8270D	100	27 – 110%	20%	34 – 110%
Hexachlorobenzene	SW846 8270D	100	40 – 111%	20%	52 -115%
Hexachloroethane	SW846 8270D	100	35 – 110%	20%	43 – 113%
Nitrobenzene	SW846 8270D	100	29 – 118%	20%	41 – 112%
Pentachlorophenol	SW846 8270D	250	24 – 168%	20%	38 - 135%
Pyridine	SW846 8270D	100	40 – 112%	20%	24 – 118%

a - Waste samples shall be extracted according to SW846 Method 1311.

b - The goals for accuracy and precision are reflective of the contract laboratory-generated limits. As such, these limits may be revised on an annual basis to reflect the laboratory-generated limits. It is not anticipated that the updates of the limits shall vary significantly from those listed.

c - Precision limit for matrix spike/matrix spike duplicate or laboratory duplicate analyses.

Table 3-2
Analytical Methods and Surrogate Recovery Goals

Matrix	Method	Surrogate Compound[a]	Recovery Limits[b]
Aqueous	8260C	4-Bromofluorobenzene	68 – 124%
Aqueous	8260C	Dibromofluoromethane	72 – 126%
Aqueous	8260C	Toluene-d_8	79 – 119%
Aqueous	8270D	2,4,6-Tribromophenol	25 – 145%
Aqueous	8270D	2-Fluorobiphenyl	34 – 117%
Aqueous	8270D	2-Fluorophenol	10 – 118%
Aqueous	8270D	Nitrobenzene-d5	33 – 120%
Aqueous	8270D	Phenol-d6	15 – 134%
Aqueous	8270D	Terphenyl-d14	24 – 133%

a - The specific surrogate compounds utilized for an analytical method may change due to method updates or other factors.

b - The goals for recovery are reflective of the laboratory-generated limits. As such, these limits may be revised on an annual basis to reflect of the laboratory- generated limits. It is not anticipated that the updates of the limits shall vary significantly from these limits.

Table 4-1
Analytical Methods, Container, Preservation and Holding Times

Analyte	Analytical Methods	Matrix	Container	Preservation	Minimum Sample Weight	Holding Time from Collection to TCLP Extraction	Holding Time from TCLP Extraction to Analytical Preparation	Holding Time for Analytical Preparation to Analysis
TCLP VOCs	SW846 1311/8260C	Solid or Liquid Waste	Glass	≤ 6°C	16 oz	14 days	NA	14 days
TCLP SVOCs	SW846 1311/8270D	Solid or Liquid Waste	Glass	≤ 6°C	16 oz	14 days	7 days	40 days
TCLP Metals	SW846 1311/6010C 1311/7470A	Solid or Liquid Waste	Glass	≤ 6°C	16 oz	180 days	180 days	180 days
TCLP Mercury	SW8461311/7470A	Solid or Liquid Waste	Glass	≤ 6°C	16 oz	28 days	28 days	28 days
Ignitability	SW846 Chapter 7	Solid or Liquid Waste	Glass	≤ 6°C	16 oz	NA	NA	14 days
Paint Filter Test	SW846 9095B	Solid or Liquid	Glass	≤ 6°C	16 oz	NA	NA	None

Table 4-1
Analytical Methods, Container, Preservation and Holding Times

Analyte	Analytical Methods	Matrix	Container	Preservation	Minimum Sample Weight	Holding Time from Collection to TCLP Extraction	Holding Time from TCLP Extraction to Analytical Preparation	Holding Time for Analytical Preparation to Analysis
		Waste						

ATTACHMENT 1

ATTACHMENT 2

APPENDIX A